5, wherein said temperature controller controls the temperature of said side wall at a value within a range of 0°C to 100°C.

12. The plasma processing apparatus according to claim 6, wherein said temperature controller controls the temperature of said side wall at a value within a range of 0°C to 100°C.--

REMARKS

By the above amendment, independent claims 1 and 4 have been amended to more clearly recite the feature of a temperature controller, claims 2 and 5 have been amended, and new claims 7-12 have been presented.

Turning to the rejection of claims 1, 3-4 and 6 under 35 U.S.C. §103(a) as being unpatentable over Redeker et al (5,800,621) in view of Hama et al (5,716,451) and the rejection of claims 2 and 5 under 35 U.S.C. §103(a) as being unpatentable over Redeker et al in view of Hama et al and further in view of Shang et al (6,055,927), such rejections are traversed insofar as they are applicable to the present claims of the application, and reconsideration and withdrawal of such rejections are respectfully requested.

The Examiner is referred to the decision of In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988), wherein the court pointed out

that the PTO has the burden under §103 to establish a prima facie case of obviousness and can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. As noted by the court, whether a particular combination might be "obvious to try" is not a legitimate test of patentability and obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. As further noted by the court, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In setting forth the rejection based upon Redeker et al, the Examiner contends that Redeker et al discloses "a sidewall which is under temperature control through a heater 49 (see col. 4, lines 39-41)", while indicating that Redeker et al lacks anticipation of the showing the antenna being provided within the vacuum vessel. The Examiner contends that Hama et al discloses a plasma processing apparatus having an antenna structure arranged inside the process room and it would have been obvious to modify the apparatus of Redeker et al so as to arrange the antenna structure inside the vacuum vessel. With respect to the additional patent of Shang et al, the Examiner

indicates that Redeker et al and Hama et al lack anticipation of showing a temperature control means in which a heating medium is used, but contends that Shang et al show a plasma processing apparatus in which the wall 70 of the chamber 10 are heated by using a heated gas or liquid, such as water, from a recirculating fluid supply 61, and that Shang et al clearly states that the walls of the process chamber may be heated in number of ways, such as by resistive heaters thermally coupled to the walls and that the method is not critical. The Examiner indicates that in view of this disclosure of Shang et al, it would have been an obvious choice of design to one having skill in the art at the time the invention was made to modify the apparatus of Redeker et al and Hama et al as to comprise the heating medium supply means for heating the chamber walls. Applicants submit that irrespective of such position by the Examiner, the cited art does not disclose or teach the claimed invention as now recited in independent claims 1 and 4 and the dependent claims of this application.

More particularly, applicants note that claims 1 and 4 previously recited the feature of the side wall of the processing chamber being under temperature control for forming on an inner wall surface thereof a coating film similar in composition to the processing gas used during etching treatment. Although the Examiner refers to temperature

control of the side wall with respect to Redeker et al and Shang et al, it is not apparent that the Examiner has given proper consideration to such claimed feature and by the present amendment, claims 1 and 4 have been amended to positively recite "a temperature controller which controls a temperature of said side wall for forming on an inner wall surface thereof a coating film similar in composition to the processing gas used during etching treatment." (emphasis added) That is, as described at page 7, lines 3-15 of the specification, the inventors have found that when the inner wall surface temperature in the reactor is controlled to a temperature sufficiently lower than that of a wafer and a constant temperature, a strong coating film is formed on the inner wall surface. Further, this coating film is polymerized much more when the temperature at film forming time is lower and when the temperature at film forming time is controlled constant, a solid layer structure is formed, accordingly, the film surface is not peeled off and damage and dust is not caused.

More particularly, as described in connection with Fig. 1 at page 15, line 23 to page 16, line 2 of the specification, on a side wall 102 of the processing chamber 100, a jacket 103 for controlling the temperature of the inner surface of the side wall is held in the exchangeable state and a heat exchanging medium is circulated and supplied into the jacket

103 from a heat exchanging medium supply means 104 so as to control the temperature. The temperature of the jacket is controlled with the accuracy of less than ±10°C within a range from 0°C to 100°C, desirably from 20°C to 80°C. The specification at page 21, line 12 to page 23, line 25, describe the manner of forming a film on the inner wall surface of the side wall through temperature control which film is similar in composition to the processing gas used during etching treatment which film is highly resistant to plasma and in which peeling and damage of the film surface are not observed even by the processing of plasma and no dust is caused. As described at page 23, lines 10-25 of the specification, the film acts as a protection film for the inner wall of the reactor and the side wall is free of consumption and damage, so that the exchange frequency of parts of the side wall can be reduced and reduction of running cost results. Furthermore, since the side wall is protected by the deposit film, there is no need to use ceramic such as SiC which is highly resistant to plasma and the cost of parts can be reduced. Moreover, the energy for heating the side wall can be reduced so that it is effective in energy conservation and a thermally conductive metal may be used. Applicants submit that the aforementioned advantages are obtained by the provision of a temperature controller which controls a temperature of the side wall for forming on an

inner wall surface of the side wall a coating film similar in composition to the processing gas used during etching treatment and that such features as recited in independent claims 1 and 4 are not disclosed or taught in the cited art.

Turning to Redeker et al, applicants submit that irrespective of the deficiencies of Redeker et al recognized by the Examiner, Redeker et al does not disclose or teach a plasma processing apparatus including a temperature controller which controls a temperature of the side wall of the processing chamber for forming on an inner wall surface of the side wall a coating film similar in composition to the processing gas used during etching treatment. Redeker et al at col. 4, lines 39-41, referred to by the Examiner, indicates that there is a heater element 49 which provides indirect heating to the wall of cylindrical dome 10 to stabilize the plasma process. More particularly, reference is made to col. 4, lines 46-49 of Redeker et al, which provides "It is desirable to heat the chamber wall (e.g., heated to about 200°C.) so that precursor gases introduced into the chamber deposit on the substrate rather than on the wall of the dome 10." (emphasis added) Thus, Redeker et al teaches away from the present invention which provides that a coating film is formed on the inner wall surface of the side wall based upon the processing gases utilized by controlling the heating of the side wall, whereas Redeker et al discloses preventing the

depositing of the precursor gases on the wall of the dome 10 and enabling depositing on the substrate. As such, applicants submit that irrespective of other features of Redeker et al, Redeker et al discloses and teaches prevention of deposition on the wall of the dome 10 by and forming a coating film thereon heating the wall of the cylindrical dome 10, which is contrary to the claimed invention herein. As such, applicants submit that independent claims 1 and 4 and the dependent claims patentably distinguish over Redeker et al taken alone or in combination with any other cited art.

With respect to Hama et al, this patent is utilized for the teaching of providing an antenna in a process room and applicants submit that this patent does not provide any disclosure or teaching control of temperature of the side wall and does not overcome the deficiencies of Redeker et al as pointed out above. Additionally, applicants submit that the proposed combination represents a hindsight reconstruction attempt in complete disregard of the teachings of Redeker et al. See In re Fine, supra. However, it is apparent that all claims patentably distinguish over the combination of Redeker et al and Hama et al in the sense of 35 U.S.C. §103, and should be considered allowable thereover.

With regard to Shang et al, the Examiner notes that this patent discloses heating the wall 70 of the chamber 10. However, Shang et al at col. 4, lines 33-60, describes a liner

15 generally in physical and thermal contact with the interior walls of chamber 10, which liner 15 is heated. As described at col. 4, lines 42-48, liner 15 may reach temperatures of between about 150°C. up to about the temperature of the susceptor (370°C.), but is generally about 250°C. Generally, the effect of eliminating condensation is improved as the liner temperature increases. At the noted temperatures, condensation on liner 15 is reduced. Further, the walls of chamber 10 are independently heated, as pointed out in col. 4, lines 54-57 of Shang et al, "to stop cleaning gas particles from sticking to interior walls 70, the temperature of walls 70 is increased by heating so that any impinging gas particles do not condense on walls 70." (emphasis added) Thus, Shang et al like Redeker et al, is directed to providing heating so as to prevent gas particles from condensing and sticking on the liner 15 or walls 70 which, if condensed or sticking, would tend to form a coating thereon. In contradistinction, as pointed out above, in accordance with the claimed features of independent claims 1 and 4 and the dependent claims, the side wall of the chamber is temperature controlled so as to form on an inner wall surface thereof "a coating film similar in composition to the processing gas used during etching treatment" (emphasis added) and such feature is not disclosed by Shang et al, Redeker et al or a combination of such patents with Hama et al. Thus, applicants submit that independent

claims 1 and 4 and the dependent claims of this application patentably distinguish over this proposed combination of references in the sense of 35 U.S.C. §103, and should be considered allowable thereover.

With respect to the dependent claims, such claims recite further features of the present invention which, when considered in conjunction with the parent claims, further patentably distinguish over the cited art. More particularly, newly added claims 7-12 recite the temperature range as being within a range of 0°C to 100°C, which temperature range is well below the temperature ranges described by Redeker et al and Shang et al, irrespective of the fact that the temperature ranges in these patents serve for preventing a deposition film on the walls of the chamber.

As to the other cited art not utilized in rejecting claims of this application, reference is made to the patent to Collins et al, U.S. Patent No. 6,024,826, which describes heating of a side wall and sealing 14 with col. 5, lines 53-55, pointing out that "The purpose for controlling the temperature of the silicon sealing 14 is, at least in part, to prevent polymer accumulation on the sealing 14...". As pointed out in col. 5, lines 57-60, the temperature is maintained above the polymer condensation (or polymerization) temperature, or about 170°C. As pointed out at page col. 13, lines 36-40, preferably the temperature of the sealing 14 and

the of the silicon side wall 12 are selected to minimize consumption thereof by etching, sputtering or ion bombardment thereof while maintaining their surfaces relatively free of polymer accumulation. Thus, this patent also is directed to heating at relatively high temperatures for preventing film deposit, which is contrary to the claimed features herein.

In view of the above amendments and remarks, applicants submit that all claims present in this application patentably distinguish over the cited art, and should now be in condition for allowance. Accordingly, issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (503.34403VP2) and please credit any excess fees to such deposit account.

Respectfully submitted,

Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600